AMENDMENTS TO THE SPECIFICATION (as Amended During International Preliminary Examination):

On page 1, immediately following the title please insert a heading as follows:

BACKGROUND OF THE INVENTION

The heading beginning on page 1, line 4 has been changed as follows:

~~Description~~ Field of the Invention

On page 1, after line 10 please insert a heading as follows:

Description of Related Technology

The paragraphs beginning on page 1, line 11 have been changed as follows:

In industry, there is an increasing demand for methods for ~~the production of~~ producing serial connections of solar cells. Particularly in the special field of photovoltaics where semiconductor particles are incorporated into a layer system in order to form a p-n junction, it is practical to combine areas of thin layers and semiconductor particles to form cells or arrays and to connect these cells in series so as to be able to tap higher voltages. The problem of the serial connection of solar cells having incorporated semiconductor particles, however, has not yet been satisfactorily solved.

~~German patent application~~ DE 100 52 914 A1, for instance, describes a semiconductor component system in which a semiconductor structure ~~consisting~~ formed of layers with incorporated semiconductor particles is completely punctured at predefined places. Insulated conductor pins are inserted into these holes that have a size of a few hundred μm and these pins are firmly connected to a conductive layer on the front. The serial connection of the arrays is achieved by installing conductor bridges, after which the arrays are electrically

separated from each other at the end of the procedure. The disconnection points are encapsulated with insulating and concurrently adhesive materials.

In another embodiment, which is ~~likewise~~ also described in ~~German preliminary published application~~ DE 100 52 914 A1, the approach taken during the production of the semiconductor component system is that different semiconductor component types (n-type material and p-type material) are applied alternately onto defined surface areas. Thus, areas with positive or negative electrodes are alternately formed on one side of a system, and these electrodes can be connected in series by an integrated connection. For this purpose, the electrode layers are interrupted alternately on the top and on the bottom. The placement of different semiconductor component types in order to create a surface with different electrodes, however, is an expensive method.

On page 2, after line 10 please insert new paragraphs and a heading as follows:

Moreover, U.S. Pat. No. 4,407,320 discloses a method for the production of solar cells in which spherical semiconductor elements are incorporated into an insulating layer. The spheres have a semiconductor of n-type material on one side whereas they have a semiconductor of p-type material on the other side. In each case, a conductive layer is applied onto both sides of the insulating layer in order to connect the spheres to each other. Furthermore, conductive separation lines are made consisting of spheres, a paste or, for example, a wire. In order to produce a serial connection, alternating cuts are made into the conductive layers on both sides of the conductive separation line.

It is also a known procedure to configure independent spherical semiconductor elements that constitute complete semiconductors, including the requisite electrodes. For example, EP 0 940 860 A1 describes using a spherical core to make a spherical semiconductor element by means of masking, etching steps and the application of various

material layers. Such semiconductor elements can be used as solar cells if the p-n junction is selected in such a way that it can convert incident light into energy. If the p-n junction is configured in such a way that it can convert an applied voltage into light, then the semiconductor element can be employed as a light-emitting element.

Moreover, U.S. Pat. No. 5,578,503 discloses a method for the rapid production of chalcopyrite semiconductor layers on a substrate in which individual layers of the elements copper, indium or gallium and sulfur or selenium are applied onto a substrate in elemental form or as a binary interelemental compound. The substrate with the layer structure is then quickly heated up and kept at a temperature of ≥ 350°C [≥ 662°F] for between 10 seconds and one hour.

GENERAL DESCRIPTION OF THE INVENTION

The paragraphs beginning on page 2, line 11 have been changed as follows:

Therefore, ~~the objective of~~ the invention ~~is to provide~~ provides a method for ~~the production of~~ producing serial connections of solar cells having integrated semiconductor elements that can be carried out with just a few simple process steps.

Moreover, ~~it is the objective of~~ the invention ~~to provide~~ provides a serial connection of solar cells having integrated semiconductor elements that is produced with just a few process steps that are simple to carry out.

Furthermore, ~~it is the objective of~~ the invention to provide provides a photovoltaic module with serially connected solar cells.

The paragraph beginning on page 2, line 19 has been deleted.

The paragraph beginning on page 2, line 22 has been changed as follows:

In the method according to the invention for ~~the production of~~ producing a serial connection of solar cells having integrated semiconductor elements, one or more conductive elements and spherical or grain-shaped semiconductor elements are incorporated into an insulating support layer according to a pattern, whereby the elements protrude from the surface of the support layer on at least one side of the support layer, and the pattern calls for at least one continuous separation line having a width B consisting of conductive elements. The areas next to a separation line or between several lines are fitted with semiconductor elements.

On page 7, after line 18 please insert a heading as follows:

BRIEF DESCRIPTION OF THE DRAWINGS

The paragraphs beginning on page 7, line 19 have been changed as follows:

Further advantages, special features and practical embodiments of the invention ~~can be gleaned from the subordinate claims and~~ will be apparent from the ~~presentation below~~ following description of preferred embodiments making reference to the figures.

The figures show the following:

Figure 1 shows, in illustrations (a) to (c), the embedding of spherical semiconductor and conductor particles into a support layer;

Figure 2 shows, in illustrations (a) to (c), the structure of front contact layers and back contact layers;

Figure 3 shows, in illustrations (a) to (b), the serial connection according to the invention of solar cells having integrated semiconductor particles; and

Figure 4 shows, an especially preferred embodiment of a shingle-like connection of several serial connections.

On page 8, after line 6 please insert a heading as follows:

DETAILED DESCRIPTION

The paragraph beginning on page 8, line 7 has been changed as follows:

Illustrations (a) to (c) of Figure 1 show the incorporation of spherical or grain-shaped conductive elements 20 and semiconductor elements 30 into an insulating support layer 10. It has proven to be advantageous here to use a flexible film as the support layer. The support layer preferably ~~consists of~~ includes a thermoplastic material into which the conductive elements can be pressed. Polymer has proven to be especially practical and it can be, for example, a polymer from the group comprising epoxides, polycarbonates, polyesters, polyurethanes, polyacrylics and/or polyimides.

The paragraph beginning on page 8, line 22 has been changed as follows:

The semiconductor elements ~~consist~~ are formed completely or partially of suitable semiconductor materials used in photovoltaics. In an especially preferred embodiment of the invention, the semiconductor materials come from the class of the I-III-VI compound semiconductors, including for instance, copper indium diselenide, copper indium disulfide, copper indium gallium diselenide or copper indium gallium diselenide disulfide. In another embodiment of the invention, the semiconductor elements consist of silicon semiconductors. These can be semiconductors made of solid material or substrate cores coated with semiconductor materials.

The paragraph beginning on page 10, line 3 has been changed as follows:

Preferably, the separation line ~~consisting~~ formed of conductive elements extends between two edges of the support layer 10 that are opposite from each other. The width of the rows of conductive elements is preferably in the order of magnitude of B = 10 μm to 3 mm and, depending on the dimensions of the conductive elements employed, is defined by one or more conductive elements. In an especially preferred embodiment of the invention, the width of the separation lines is between 10 μm and 30 μm. If spherical or grain-shaped particles are used as the conductive elements, the width of the separation lines is a function of the diameter of the particles employed. Consequently, the width of the separation lines can also be in the order of magnitude of one or more diameters of a conductive sphere, especially between 10 μm and 500 μm.